DOCUMENT RESUME

ED 228 064 SE 041 261

AUTHOR Olson, John K.
TITLE Mr. Swift and the Clock: Understanding Teacher Influence in the Science Classroom.
PUB DATE 83
NOTE 17p.; Paper presented at the annual meeting of the American Educational Research Association (Montreal, Canada, April 1983).
PUB TYPE Reports - Descriptive (141) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Conventional Instruction; Elementary Secondary Education; Inquiry; Science Education; *Science Instruction; Science Teachers; *Secondary School Science; Teacher Behavior; *Teacher Influence; *Teacher Role; Teaching Methods; *Teaching Styles; *Time Factors (Learning)
IDENTIFIERS Canada

ABSTRACT

Presented are views of a Canadian science teacher (Mr. Swift) on the nature of his science teaching and a discussion of a conception of influence which aids in understanding his ideas about time. Mr. Smith uses a provincial government syllabus, ignoring locally developed units and recent textbooks emphasizing student inquiry in favor of syllabus content with its stress on terminology and definition (science as "vocabulary"). With such a syllabus of well-defined subject matter to deal with, Mr. Swift is able to exert his influence on the classroom. He sees teacher-controlled activities as having a definite goal and a definite time to achieve the goal. In addition, the syllabus guidelines regulate time for Mr. Swift; squandering time is what the guidelines help him avoid by showing what material needs to be covered and giving a legitimate reason to stress control of student activity. This emphasis on control of teaching situations (influence) is addressed, considering the relationship between how teachers construe influence and persistence of the syllabus system. How teachers think about influence is illustrated by two approaches to science teaching based on high and low levels of teacher influence. (JN)

Mr. Swift and the the Clock: Understanding Teacher Influence in the Science Classroom

John Olson
Queen's University at Kingston

This paper is prepared for the Symposium "Inquiry, Socialization and Milestone of Teaching; Case Studies of Science in Canadian Schools".

American Educational Reasearch Association
Montreal, April 1983

Introduction

This paper recounts the view of one teacher about the nature of his science teaching: we note that Mr. Swift, a teacher of grades 6-8 science, pays strict attention to what he is expected to teach[1]. A document issued by the provincial government mandates certain material to be taught; Mr. Swift sticks closely to the letter of this syllabus, ignoring along the way locally developed units and recent textbooks. These which represent elaborations on the provincial document developing its intentions through emphasis on student inquiry. Mr. Swift ignores these in favour of the syllabus of subject content and its stress on terminology and definition -- science as "vocabulary".

With such a syllabus of well defined subject matter to deal with, Mr. Swift is able to exert his infuence on the classroom. What I call the syllabus system enables him to keep at bay the evil effects associated with teaching as a diffuse activity. The well defined material goes hand-in-hand with an approach to teaching which emphasizes recitation at the expense of inquiry. What I saw Mr. Swift doing, I had seen earlier in a study of science classrooms in the U.K. There I saw teachers re-construct inquiry oriented materials produced by a major curriculum project to form a syllabus of content to be taught by traditional teacher dominated methods of recitation.[2]. Where there was no syllabus one had to be created. Why this urge to create a syllabus? Is it a matter of creating order out of chaos? Taking the teachers' view, I think that is what is happening. Through the exercize of what I call influence, I believe teachers are able to mitigate some of the nerve-wracking aspects of teaching--an activity known for its diffuse characteristics.

In the first part of the paper I introduce Mr. Swift and his concerns; in the second, I discuss a conception of influence which I believe allows us to understand his ideas about time.

Mr. Swift

Mr. Swift joined the school in 1972 when he took charge of the science program in grades 7 and 8. At that time local control of the curriculum was the policy of the Ministry of Education whose guideline did not mandate material to be covered. The document did outline the curricular policies in general terms and included illustrations of how these policies might be realized through local action. Thus Mr. Swift was left to his own devices when it came to planning the program for the school.

The science room as he found it then, he said, was much as one finds it today. There are six three-bench groupings, each seating six students who are organized as a team; one student in each group acts as the leader. Along the south side of the room is a work-bench with six sinks; above the work-bench are cupboards containing class sets of two textbooks written to conform to the pre-1972 guidelines. As well, there is a half-class set of textbooks written according to the 1978 guidelines, which reintroduced considerable content specification as part of the curriculum policy of the Ministry. In the cupboards are pieces of equipment which had been obtained as part of the Ontario Teachers Federation Science Project.

On the chalkboard next to the noticeboard is the program of units to be covered that year. Grades 7 and 8 do the same units each year; each unit is taught every two years. The cycle is currently at Year II. In Year I the following units are covered: Classification of Living things; Interdependence; Properties of Matter; Measurement I; Science Fair; Science Happenings. In Year II of the cycle the following units are covered: Characteristics of Living Things; Measurement II; Force and Energy; Plants; Science Fair; Science Happenings. A number of units are mandated by the Ministry guidelines, and others can be found in the guidelines but are optional; Science Fair and Science Happenings are local units.

When Mr. Swift came to the school there were no mandated

units. He tells what it was like then.

Swift: My academic responsibility when I came here was (to develop) a science program in the school--there was no science program. It's grown from almost zero....I keep getting a little more each year in that my spread is increasing (to include grade sixes). When I was given the mandate I was apprehensive. (I was told) to do it and to it well. There was no doubt in my mind what was wanted.

Olson: You were concerned from a subject-matter perspective?

Swift: Because of my failings in University science....(but) let's look at another reason why: no real guidelines, as they are today. (Only) "this is what they do down at Pine Secondary School." That was my guide.

Lacking guidance, Mr. Swift sought out sources of support, including guidelines from other boards, Teacher Federation units and workshops, and advice from a local secondary school. One of the school's recent curriculum priorities had been to ensure that the Ministry guidelines for the Intermediate (7-8) grades were implemented.

The advent of these guidelines signalled a watershed in Mr. Swift's career:

> To me the Ministry guidelines are a godsend; I put a great value on them. Also, because I tend to look at myself professionally as an organized person, I have to break it down into little organized units for me to move ahead and to present the material in an organized form. The philosophy (in the guidelines) goes on and on, and it could be condensed. What to look for is the units themselves. . . I feel that I'm accountable for what's in the Ministry document.

Before the advent of the 1978 document Mr. Swift said he was not sure that the tack he took in his teaching was what was expected.

> If you had nothing to guide you you can skirt over it (a topic) too easily. When I had no guide I could take my sweet time and, let's say, do plants all year if I wanted to....(Now) I feel that I'm accountable. I feel that way because at a number of meetings that I was at it was said, "They're your parameters. You'd better work with them."

From our conversations it became clear that teaching science with and without guidelines are very different contexts for Mr. Swift. Without guidelines what is to be taught is unclear, and it is impossible to organize the material into carefully timed

parts. The danger of drift was constantly present when the work was not under the control of some regulation. The 1978 Ministry guidelines supplied Mr. Swift with a regulating mechanism--the presenting of the core material of those guidelines to students. The sheer amount of material, however, creates a situation in which certain activities had to be reconsidered, given the amount of time they require and their tenuous connection to what the guidelines require. Given a budget of limited time and an extensive program of material to cover, the use of time is a critical factor for Mr. Swift in deciding how to proceed. Time becomes a factor influencing not only what is presented, but how the material is presented. With the guidelines authoritatively mandating content to be covered, Mr. Swift was left with the task of deciding how that content might best be dealt with; covering the material in ways that are interesting yet not time-consuming.

To pursue in greater depth Mr. Swift's attempts to resolve this dilemma, I asked him to sort statements of science teaching activities, which ranged from highly teacher-controlled to student-controlled[3]. These statements, which were written on small cards, be arranged in a number of groups according to some underlying construct he had chosen to organize his thinking about the set of twenty statements. We then discussed these activities in relation to the set of constructs he had used to sort them.

One important construct he used to organize the groupings--an overarching construct--was that of "keeping on track" vs. "squandering time." He said all of the activities could be organized along this dimension. Teacher-centred activities were seen to be on-track activities: "I, as the teacher, know where I'm going and I don't want to be thrown off track too much. I have a definite goal to achieve and a definite amount of time in which to achieve it." The importance of knowing the goal and relating time to its achievement can be seen in how Mr. Swift views an activity in which students are at work doing an experiment to verify a law. As Mr. Swift sees it, he has limited control here:

> If a kid messes around for 40 minutes and measures

> a couple of minutes, copies and makes up data for the rest of the time, I can't control that part. . . On the other hand, when I'm in control, the kid may be wasting time if his mind is outside.... When people are given freedom there's a greater tendency to take advantage of freedom, to horse around. I think I've found an answer to this, but I don't think I can live with it.

I asked Mr. Swift to explain what the answer might be to this dilemma. He spoke of problems in approaching a field trip to the Ontario Science Centre. To make sure that time wasn't wasted, he had the students do four worksheets while they were at the Centre. The students complained to him afterward that they hadn't had time to complete the worksheets. Should they be allowed to go their own way at the Centre and perhaps "squander" their time, or be required to do the sheets and perhaps enjoy the visit less? Mr. Swift is aware that there is an important dilemma here and that he has to resolve it before the next trip to the Centre. As he said, "There's a lot of messing around. I can't be with each child. What's wrong with messing around in a place like the Science Centre? What happens if they push a button ten times. Isn't that discovery? I can't argue with that, but I'm uncomfortable with that situation. I guess I have a way of controlling it."

Mr. Swift sees teacher-controlled activities as having a definite goal and a definite time to achieve the goal. If time allows, then students can be involved, but if time presses, "If that clock says I've got five more minutes to get that done so that they can get their note, I'll eliminate (discussion) and revert to (telling them). . . It's safe. I know where I'm going." Mr. Swift talked about "savouring" his lesson time vs. having to "cover" the ground:

> So, let's say the lesson is broken down into four units of time. Let's say an hour lesson, and I've used half the time. One of the 15 minutes I've done in 7 1/2 minutes; now I've 22 1/2 minutes to do the rest. If I get my 15 minutes done there, I may, if I like, have 7 1/2 minutes savouring time. I can do the lesson and enjoy it and spend some time developing an answer from a child. If it goes the other way and (I use more than 15 minutes) then I'll really speed up and go like heck.

For Mr. Swift the guideline regulates the time. It prevents time from being wasted. How does he view those occasions when time is unavoidably lost? Mr. Swift defends his "lapse" of time management: "I must confess . . . : there were a couple of things I did that cost me in terms of periods, say 3, 4, 5 periods, but I enjoyed it. Without it I don't think I could radiate any love of what I'm doing."

Other activities had more potential for the squandering of time, although they could also have benefit for the students. Mr. Swift was aware that in stressing "efficient" activities he was perhaps giving up on other things; take, for example, asking students to engage in some thinking out loud in hypothesizing about something they had seen:

> For the good ones, a chance to participate, a chance to help the teacher, to formulate something; a chance to see his idea go on the board when I trigger the idea in him, and it's exactly what I wanted to have anyway.

Field trips present special problems for the efficient use of time.

> This plant unit we are doing. I didn't go out. It would have been a fun period with each class. We may have got it done. I gave it up. . . . One thing we did last year, we went to a creek within walking distance of the school. It did not upset the system, and this is something else you have to watch. You upset the timetable and it snowballs. So that's enough reason for not doing it as often. I shouldn't say that. If I wanted to do it, I'd get it done.

To Mr. Swift squandering time was just what the guidelines helped him avoid doing by showing him what material he needed to cover and by giving him a legitimate reason to stress control of student activity--particularly control through a "vocabulary" approach to science teaching. It is this emphasis on control of the teaching situation - what I call influence - that I want to focus on because I believe that if we understand how teachers construe their influence, one ought better to understand the implications for teachers of curriculum proposal which alter their control of the teaching situation.

Before discussing Mr. Swift's case, I want to turn to the concept of influence itself. In an earlier study I interpreted teacher views about the role of discussion in science teaching in terms of the loss of influence it appears to present to teachers. I think that earlier study is relevant to our understanding Mr. Swift's conceptions of time and its regulation. In that study, using a clinical interview method similar to the one Mr. Swift participated in, I identified two conceptions of influence at work in teacher talk--high and low[4]. I found that high influence could be divided into two forms: information transfer and teacher guidance. Here I will briefly condense the description and urge the reader to consult the earlier work for the details.

Conceptions of Teacher Influence

The notion of influence goes beyond mere control of the class. Through influence, the teacher exercizes his/her craft; it is exercize of influence that provides teachers with satisfaction in their work. Teachers are aware that science education theorists and modern science curriculum projects often expect them to use methods which involve low teacher influence. Yet the methods espoused by such projects are rejected by teachers, or, more importantly, teachers do not appear to construe these approaches effectively, and thus important parts of innovative doctrines are not implemented. Teachers persist in using more familiar, better understood practices like the syllabus system and recitation that I mentioned above.

What then is the relationship between how teachers construe influence and the persistence of the syllabus system? As teachers construe their teaching, work in the classroom is directed not primarily towards what happens in students' heads, but to what happens in the social encounters with students, and how the

influence that the teacher can bring to bear affects the progress of the class towards completing the work to be covered in a reliable and credible way. Influence, as teachers construe, it is based on being able to provide the stimulus, expert guidance and guaranteed information needed to help students obtain the credentials they expect to gain. The teacher authenticates what is transacted and guarantees it. Sources of influence, as teachers see it, are not based on an understanding of psychological principles, nor on the structure of their discipline, but on their ability to convince the students that what is happening is well produced and directed. The teacher is able to balance the competing demands made upon him/her by the nature of school goals, the kinds of social relationships possible in classrooms and the limitations of technique.

As the teachers I talked to in England saw it, being a teacher was like being a mountain guide; someone hired because s/he knew the way to the summit and how not to fall. Such a guide adopts direct methods and is linked directly to those who follow. The relationship between the mountain guide and the climbers simply doesn't involve low influence climing methods; they are hazardous, for one thing, and time consuming.

The analysis of how teachers construed influence indicates that teachers use high influence teaching not only to keep students at their work, and their behaviour within acceptable bounds, but also to obtain for themselves a sense that something is being accomplished; that work is being done. The evidence they seek to confirm this does not seem to come from what the pupil attains intellectually, it comes from the ability of the teachers to promote "good" work, and convince students of the need to do that work. As Philip Jackson has pointed out, "Teachers, particularly in the lower grades seem to be more activity-oriented than learning-oriented"[5] and he argues as I would, that teachers do not give a lot of thought to the precise outcomes of instruction; rather they select activities which they think will be good for their students. I would add that the teachers select activities that are good for themselves; that is, approaches which permit

the teacher to exercize influence over the work of the class in a direct manner and with tangible effects so that a sense of accomplishment can be perceived.

Teachers seek to establish in their work, ways of assuring themselves and others that work is being done, and they search for measures of that process. To change the metaphor, I would say that teachers develop relatively clear-but systems of monitoring and measuring progess and obtaining reflections of their influence; these systems I have termed the syllabus system. It is the system that Mr. Swift so welcomed in the form of the Ministry guidelines.

Let me illustrate how teachers think about influence by reference to two kinds of approaches to science teaching based on the level of teacher influence. High influence can be divided into two approaches: teacher as "prime mover" and as "navigator". Acting as prime mover serves a number of functions; the main one being that the teacher can ensure that important information is transferred to the student during a process in which pupils pay attention to the teacher. The transfer of information involves clues not to engage the student intellectually, but it does get across facts without which, the teachers I talked to argued, further more stimilating activity could not occur. The teachers emphasised that it was necessary to give notes and to lecture in spite of the drawbacks. However, their comments intimated that they did not want it thought that this was all that they did, nor that they didn't realise that there was limited intellectual challenge for the student. Information transfer was construed as; menial, not ideal, rote, humdrum, the pupil as a sponge:

> Pupils sitting at their seats doing physics problems - that's menial, but it is essential...Pupils sypplying labels - you don't really need to understand what it's all about to label a spade a spade sort of thing. You can do that and be successful at it, but have no idea what's going one. It's menial in that sense, but it is essential.

Teachers construed a number of teaching events in terms of

their controlling the direction and point of the lesson while allowing students to participate. This function involves the teacher as navigator. The following comments illustrate why the teachers thought that it was important that they navigate the lesson:

> I would never like to have a class sort of hung up too high and dry (with their) going out of the room thinking, "Well, what on earth am I supposed to make of that one?

> They've got to believe in what you are saying. If they think you are unsure of your facts, they switch off. Do they trust you are telling them the right things they need to know, and, in fact, is the stuff you are telling them factually correct?

The teachers took it as their task to ensure that the lesson had a valid point and that the students could trust the teacher to make sure that the class ended up with the right information and the correct ideas. Simultaneously, they had to ensure that the lesson did not go astray. The former might be called the 'editorial' and the latter the 'director' function. The following comments describe the editorial function with the key terms underlined:.

> The teacher guides the discussion and puts them right if they are wrong. He takes out what isn't quite relevant. Now the teacher is a physiotherapist, putting right any of the ills.

Teachers' coments concerning low influence teaching contrasted sharply with those associated with high influence teaching. Where teachers were clear about what they were trying to accomplish and how to go about it in the latter case, they were unclear about the effects of their teaching and their role in the former. Where they had been definite, realistic and evaluative in their comments, they became tentative, detached and unrealistic. All of these trends suggested that high and low influence teaching are construed in quite different ways by teachers, and that they represent quite different forms of teaching.

Two main themes emerged from comments about low influence teaching (which involved the teacher acting as a dis-

cussion teacher, or organising a student seminar, or field work, or setting essays on social issues topics). First, teachers found it difficult to talk about the intellectual activity which they tended to associate with low influence. Their talk about intellectual goals seemed vague and loosely related to what they said they did in class. Secondly, t teachers had difficulty seeing how they or their pupils were meant to behave. They were not sure where their influence lay.

The other theme running through the teachers' comments about low influence teaching concerned the authority of the teacher. The teachers found it difficult to understand how they should behave and how to construe their students' behaviour, and, because of an apparent lack of experience, the teachers tended to think of low influence teaching approaches as if they were ineffective variants of more familiar forms. The following comment indicates the nature of the dilemmas teachers faced in relation to low influence teaching:

> It's quite foreign to a lot of science teachers (being a neutral chairman). They deal with a lot of facts and here we are asking for discussions which could be very open-ended....It's very difficult to manage (a discussion) with some of them absent, or some have the facts and some don't... Then you've got pupils at different levels of maturity to discuss something. Whereas some can and they might be mature enough to put forward certain views, but not in a mature manner laughing about it, giving some stupid sort of view.

What do these comments tell us about how teachers construe their role in low influence teaching? It is evident that the teachers tend to contrast such teaching with that where they are in-charge and able to act in familiar ways. In other words the familiar role becomes a basis for describing and evaluating the low influence situations. These situations tend to be construed in terms of the extent of teacher withdrawal from a central role. Images of retreat and withdrawal, or abdication of the teacher role entirely (technician, librarian) are used. the following list captures the way teachers construed their 'retreat':

> The teacher doesn't seem involved.
>
> The teacher is just a controlling person in the background,

if necessary...The teacher is a guiding hand.

I'm likely to be hovering, guiding, inspiring, ticking off... I really don't know how to handle that role (neutral chairman).

If the teacher does stay as technician-librarian, in other words, there's the resource, get on with it....

The teacher is acting as an observer.

The teacher is to some extent merely a technician,

The teacher is acting as a referee.

The teacher has disappeared further into the background The sense of withdrawal comes through clearly, and the words like 'merely' or 'just' suggest a negative appraisal of the role. the term 'technicians' is probably used to suggest something less than a professional role for the teacher. The teacher is cast as a referee in a game whose purpose and rules are unclear. It is hard to see how such a position could be acceptable to teachers.

The general trend of teachers' comments suggested more concern about making sure the point and direction of the lesson were established than with the intellectual stimulation of the student. Teachers did not emphasise intellectual benefits of the approaches they favoured; they emphasised the opporutnity these approaches gave them to exercice influence; an influence directed towards covering the syllabus and ensuring that the required material was transferred and understood by the pupils in the correct way.

In her contribution to an extensive report on science education in the USA funded by the National Science Foundation ('Case Studies in Science Education'), Francis Stevens said that "a disciplinary curriculum and authoritarian teaching are easiest for everbody." The report concluded that teachers did not adopt inquiry methods because they are unwilling to risk situations in which they may not know the answer, and it suggested that teachers lack experience in dealing with the questions of thoughtful students on doubtful topics. The report indicated that, rather than stressing intellectual development, teachers concentrate on 'socialisation' - preparing students to progess in their school

career. Such a conception of teaching, it was argued in the report, provides teachers with milestones to measure progress:

> Some 'milestones'...seemed to be necessary if teachers were to shepherd their students through the subject matter without suffering the complaints of their colleagues.[6]

Seeking milestones in teaching as a form of coping strategy might have a broader application than to just an agreed upon content -- a syllabus. One might hypothesize that teachers seek to establish in their work, and in their relationships with students, ways of assuring themselves and others that work is being done; these are the milestones which function as part of a system of monitoring and measuring progress which provide teachers with reflections of their influence. The milestones teachers valued in the study were: the accumulation of notebooks, the exam rehearsals and the exam results, the licenced content authoritatively taught and recorded; these were the familiar markers of their classroom life.

Mr. Swift's Influence

Now it is in terms of the concept of influence that I have tried to make sense of Mr. Swift's views about teaching. What struck me about his thinking was the idea of the syllabus as a regulator. To him it was like a clock or a metronome set for the desired beat. Thinking back to the work I did in England I decided that Mr. Swift was telling me more about the nature of the syllabus system and the role it plays in helping the teacher exert influence. Influence is what Mr. Swift is after; you might say that influence is how he exercizes his craft and knows he is exercizing it. Influence gives him something to push against--his students; it gives him a way of measuring craft activity; a sense of so much done in so much time. Teaching can be like trying to push clouds around; how do you know if you are doing anything? The teachers in England I talked to were most concerned to see the measures of their progress, and sought them where they could find them. Increased student capacity to think

was not one of the things they felt they could get a measure of; filling notebooks was. You might say that the syllabus contains the stock-in-trade of the teacher and influence is how the stock is traded. When the syllabus is "emptied" and the notebooks filled, then the teacher has some idea of the progress made. Thus both spacial and temporal metaphors seem apt here. Steven's "milestones" and my "clock" are both ways of expressing some element of what teachers are after in their work. Elsewhere I have argued that these craft elements are a functional response to the diffuseness of teaching as an occupation.[7] Mr. Swift is like the other teachers; he, too, found it hard to operate without a syllabus to "empty"; he, too, was prepared to trade intangible but desirable events for tangible ones; dilemmas abound here because teachers are dammed if they do and if they don't and some of them know it.

So what of curriculum reform? Do we need more innovations? I think not; not right now. Do we need to help teachers become more conscious of the dilemmas they face? I think so. If this is the case, then reform comes through teacher education, not through more packages. Perhaps curriculariists ought to begin to fix on the educational functions of their craft working with teachers in small groups with problems that arise from teaching itself. Such a deliberative approach to reform is worth looking at in light of the structures and functions of teaching as an occupation.

NOTES AND REFERENCES

1. See Russell T. and Olson, J. Science at trillium: science teaching in an elementary school in J. Olson and T. Russell (Eds.) Science education in canadian schools Vol. III, Ottawa: Science Council of Canada, 1983.

2. Olson, J. Teacher influence in the classroom: context for understanding curriculum translation. Instructional Science, 10, (1981) 259-273.

3. See Olson, J. Studying innovation in science teaching: the use of repertory techniques in developing a research strategy. Eur.J. Sc. Educ., 4,1982, 193-201.

4. The following discussion of influence is based on my: Dilemmas of inquiry teaching: how teachers cope in J. Olson (Ed.) Innovation in the science curriculum. New York: Nichols Publishing Company, 1982. For typologies of teaching similar to the one here see also Walker, R. and Adelman, C. A guide to classroom observations. London: Methuen, 1975 and Eggleson, J. et al, Processes and products of science teaching. London: Macmillan, 1976.

5. Jackson, P.W. Life in classrooms. New York: Holt, Rinehart and Winston, 1968.

6. R. Stake, and J. Easley (Eds.) Case Studies in Science Education, Urbana, Illinois: CERI, 1978, 16:22.

7. Olson, J. Teacher constructs and curriculum change, Journal of Curriculum Studies, 12, (1980), 1-11; and For further discussion of diffuseness in teaching see, for example, Delamont, S. Interaction in the classroom. London: Methuen, 1976; Wilson, B. The teacher's role: A sociological analysis, British Journal of Sociology, 13, (1962) 15-32 and Lortie, D. Schoolteacher, Chicago: University Press, 1975.